Energy Frontier meeting at Brookhaven

Concluding remarks

Peskin / Brock
April 2013

This has been the most scientifically interesting Snowmass meeting yet.

Thanks to all of you for your contributions.

Special thanks to:

The Energy Frontier working group conveners
(an all-star cast)

Sanjay Padhi, Sergei Chekanov

Norman Graf, Akiya Miyamoto, Mikael Berggren

Goals of the Energy Frontier study:

We need to articulate a scientific program and its motivation:

I. What scientific targets can be achieved before 2018 ?

II. What are the science cases that motivates the High Luminosity LHC ?

III. Is there a scientific necessity for a "Higgs Factory" ?

IV. Is there a scientific case today for experiments at higher energies beyond 2030 ?

For these issues, we must clarify in our own minds:

Where is the physics beyond the Standard Model ?

What did we learn from LHC 7/8 TeV ?

What does this tell us about the next step ?

Community goals:

I. Present our case to our HEP colleagues

II. Justify our ambitions to government

III. Explain our goals to scientists in other fields and to the general public

These require:

A clear expression of why we do what we do.

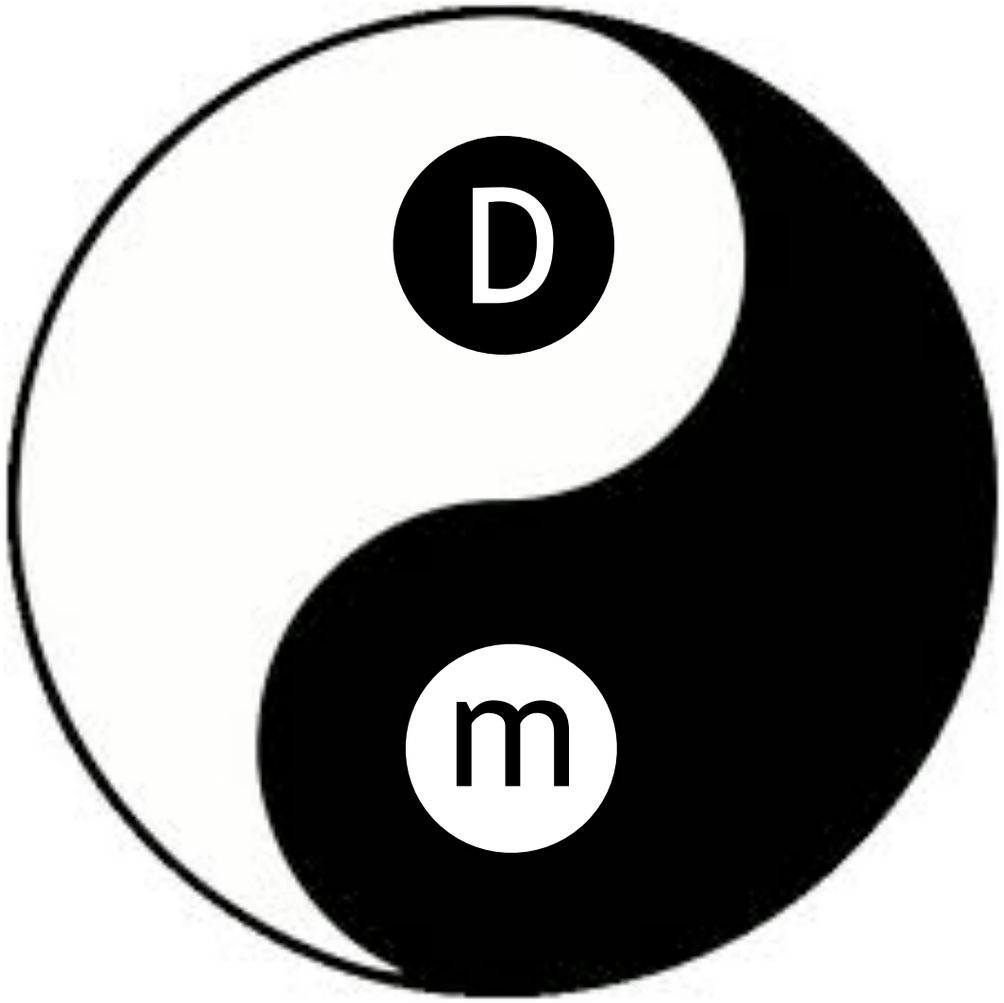
“Discovery stories” :

Concrete illustrations of discoveries that could take place before 2020,
and the experiments that would pursue the new direction that is opened

White paper on US participation in global projects

A unifying principle for all of Snowmass:

light side / dark side



Okun

Gauge principle / Vacuum structure

Maxwell's equations

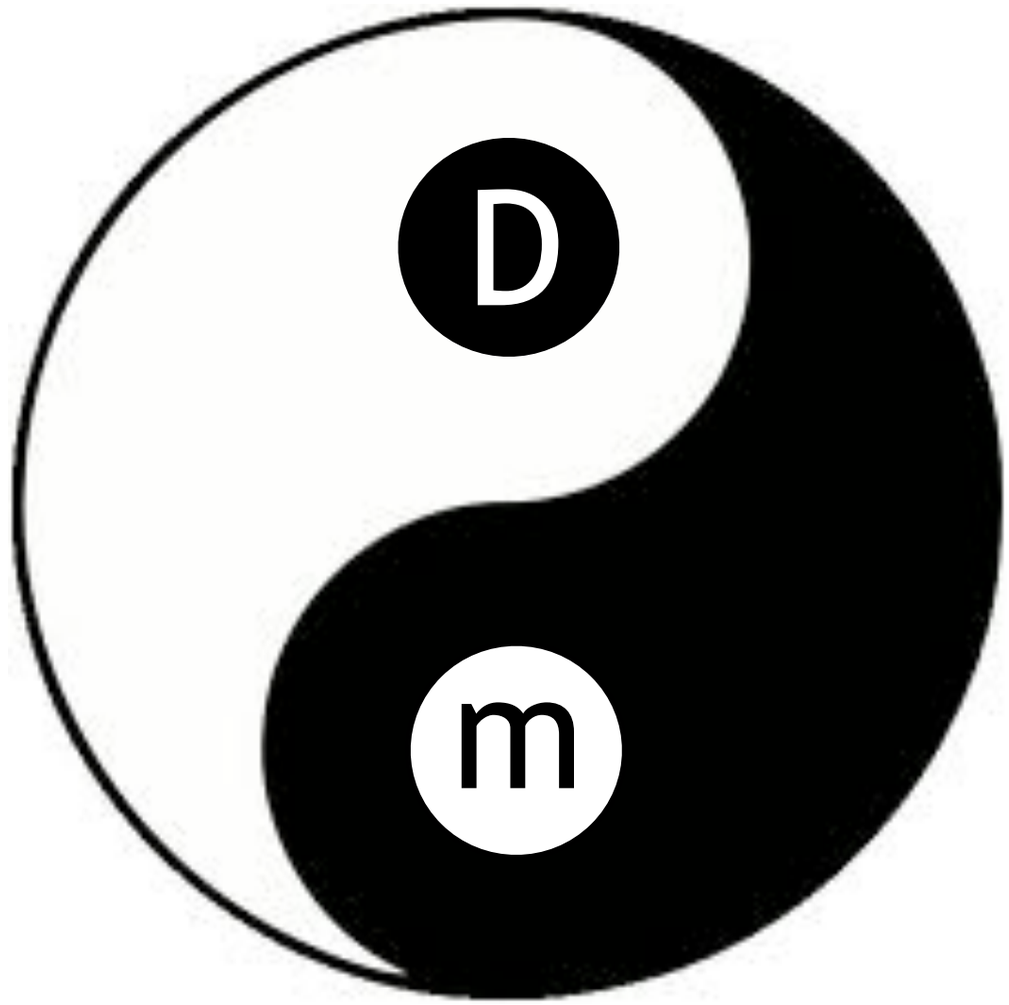
Quantum numbers

Parity violation

W, Z boson

Asymptotic Freedom

Standard Model
all-powerful



W, Z mass

Quark masses and mixings

CP violation

L, B violation

Dark energy

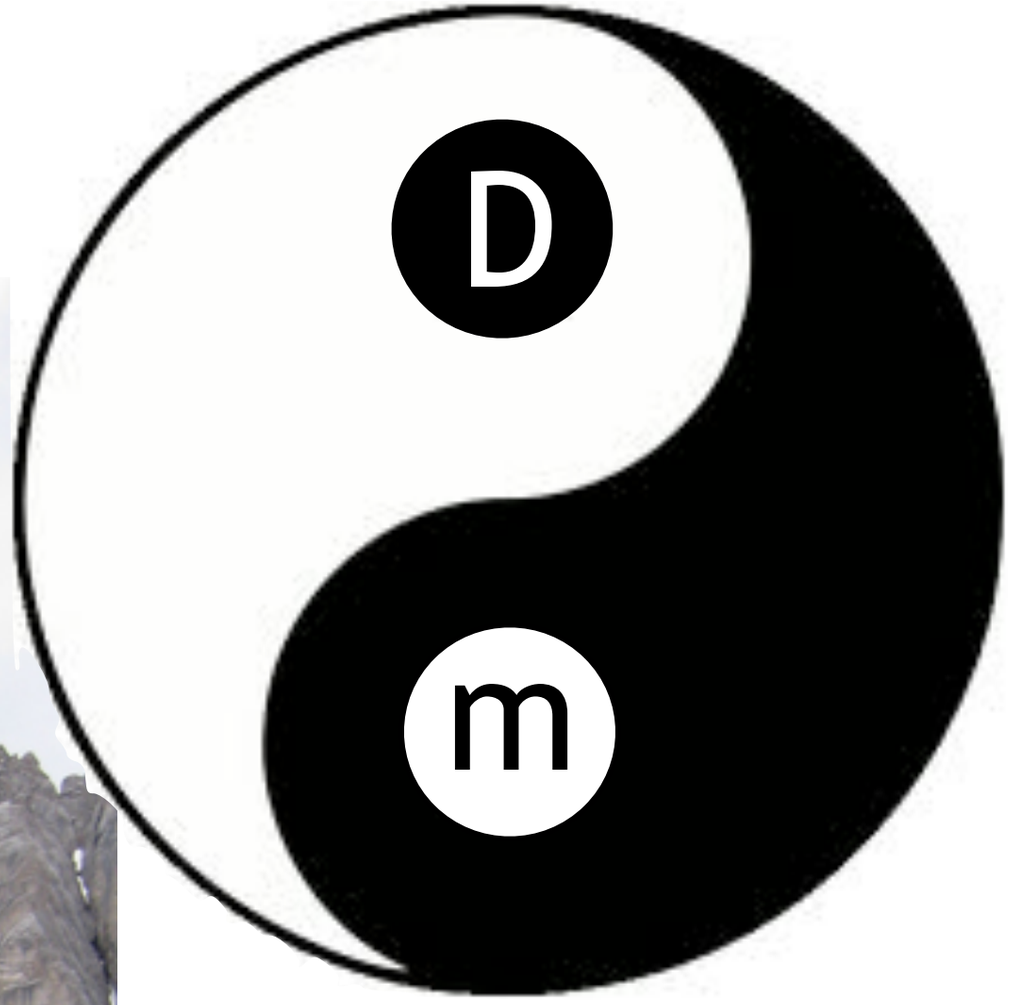
Standard Model
impotent

Dark matter ?

The mountain pass through which all explanations on the dark side must flow:

Why is electroweak symmetry broken ?

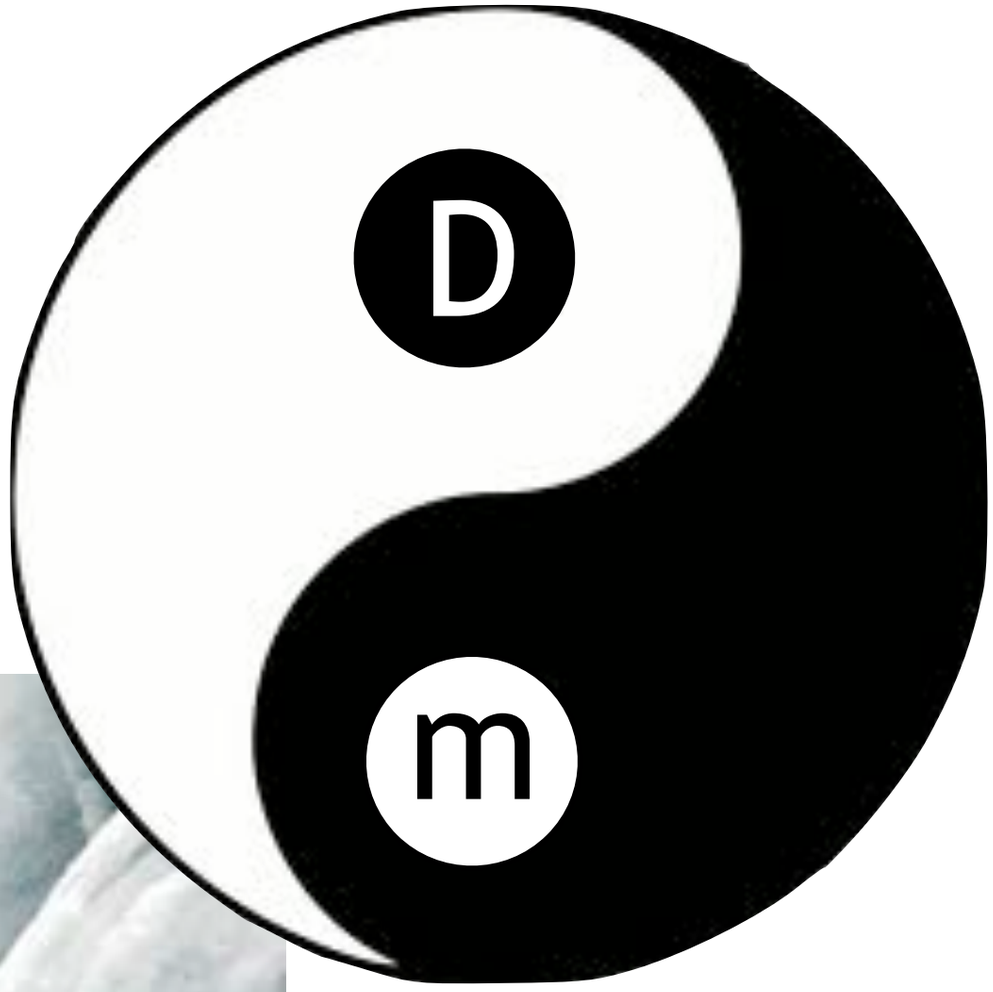
What is the mechanism ? What is the agent ?



After decades of struggle, we finally have a toehold on the dark side with the discovery of the Higgs boson.

We must follow up this discovery !

The explanation must be found at the TeV energy scale !



Next steps for our study:

LHC background generation with the finalized Snowmass fast-sim framework
is beginning now.

New Phenomena will meet in May at the LPC at Fermilab
QCD will meet in May at Florida State (Loopfest)
Electroweak will meet in June at Northwestern
other groups will meet by phone/Vidyo

Please follow:

http://www.snowmass2013.org/tiki-index.php?page=Energy+Frontier+Study+Workshops

Theory meeting at the KITP (3 Frontiers) -- May 29-31 :

http://www.kitp.ucsb.edu/activities/dbdetails?acro=snowmass-c13

Final general meeting of the Energy Frontier working groups:

U of Washington, Seattle June 30 - July 3 (just after LP2013)

https://sharepoint.washington.edu/phys/research/snowmass2013/Pages/

Program for Seattle:

First-draft White Papers from the community are due.
We will schedule talks presenting these.

Draft conclusions from the working groups will be presented and discussed.

The White Paper on US participation in global projects will be presented and discussed.

We will schedule sessions devoted to instrumentation and computing challenges for LHC upgrades and next-generation collider experiments.

This is the “put up or shut up” time for the Energy Frontier study.

Tell your colleagues that they must care about the conclusions of our study, and that they must show up in Seattle and participate.

Program for Minnesota: July 29 - August 6

The work of the Energy Frontier study will be done. In Minnesota, we will present it to the broader HEP community.

Parallel sessions will present the major issues of the study for community discussion:

Higgs, new particle searches, precision measurement

and comparison of the reach of these probes to those of Intensity and Cosmic Frontier

Panel discussions will debate high-level issues:

overview of the comparison of Frontiers

priorities of domestic vs. global experimental program

Energy Frontier represents a large part of the US community.

We must show up in force.

This has been an exceptionally well run meeting.

We are very grateful to:

Sally Dawson, Hong Ma, Howard Gordon

Ray Dumont, Alex Reben, Joe Rubino

Linda Feierabend

The product of our study will be very important for the future of HEP, both in the US and globally.

Press on!